This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A method of determining an overlay error between two layers of a multiple layer sample, the method comprising:

for each of a plurality of periodic targets target that each have a first structure formed from a first layer and a second structure formed from a second layer of the sample, measuring a plurality of optical signals at a plurality of incident angles, wherein there are predefined offsets between the first and second structures; and

determining and storing, in memory, an overlay error between the first and second structures by analyzing the measured optical signals at the plurality of incident angles from the periodic targets using a scatterometry overlay technique based on the predefined offsets without using a calibration operation or a model-based regression technique,

~~wherein each first structure has a first center of symmetry and each second structure has a second center of symmetry and wherein the first center of symmetry and the second center of symmetry for each target are offset with respect to each other by a selected one of the predefined offsets~~

wherein the scatterometry overlay technique is a phase based technique that includes representing each of the measured optical signals as a periodic function having a plurality of measured, known parameters, which are obtained from the each measured optical signal, and an unknown overlay error parameter and analyzing the set of periodic functions to solve for the unknown overlay error parameter to thereby determine the overlay error.

2. (original) A method as recited in claim 1, wherein the plurality of measured optical signals for each target are obtained simultaneously.

3. (original) A method as recited in claim 2, wherein the plurality of measured optical signals for each target are obtained simultaneously by a simultaneous, multiple angle of incidence ellipsometer.

4. (original) A method as recited in claim 3, wherein the ellipsometer includes a plurality of detector elements that are each arranged to detect a one of the plurality of measured optical signals for each target.

5. (currently amended) A method ~~as recited in claim 1, further comprising~~ of determining an overlay error between two layers of a multiple layer sample, the method comprising:

for each of a plurality of periodic targets target that each have a first structure formed from a first layer and a second structure formed from a second layer of the sample, measuring a plurality of optical signals at a plurality of incident angles, wherein there are predefined offsets between the first and second structures;

determining and storing, in memory, an overlay error between the first and second structures by analyzing the measured optical signals at the plurality of incident angles from the periodic targets using a scatterometry overlay technique based on the predefined offsets without using a calibration operation or a model-based regression technique, wherein each first structure has a first center of symmetry and each second structure has a second center of symmetry and wherein the first center of symmetry and the second center of symmetry for each target are offset with respect to each other by a selected one of the predefined offsets; and

comparing the measured optical signals to theoretical data, using a model-based regression technique, to thereby determine and store, in memory, a second overlay error between the first and second structures.

6. (previously presented) A method as recited in claim 5, further comprising comparing the first overlay error to the second overlay error to thereby adjust the model used to generate the theoretical data.

7. (original) A method as recited in claim 2, wherein the plurality of measured optical signals for each target are obtained simultaneously by a beam profile reflectometer.

8. (original) A method as recited in claim 2, wherein the plurality of measured optical signals for each target are obtained simultaneously by an Optical Fourier Transform reflectometer.

9. (original) A method as recited in claim 2, wherein the plurality of measured optical signals for each target are obtained simultaneously by an Optical Fourier Transform ellipsometer.

10. (original) A method as recited in claim 2, wherein the plurality of measured optical signals for each target are obtained simultaneously by an Optical Fourier Transform polarized reflectometer.

11. (cancelled)

12. (original) A method as recited in claim 1, wherein the overlay error is determined without comparing the measured optical signals to calibration data.

13-14. (cancelled)